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Subject: FINAL REPORT FOR THE SOIL SAMPLES FROM 216-S-20 CRIB 222S20040166

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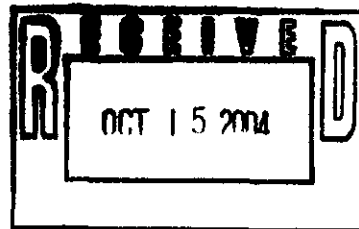


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P.O. Box 1500
Richland, WA 99352

October 13, 2004

CH2M-0403032

Mr. S. J. Trent, Manager
Environmental Information Systems
Fluor Hanford, Inc.
Post Office Box 1000
Richland, Washington 99352-0450



Dear Mr. Trent:

FINAL REPORT FOR THE SOIL SAMPLES FROM 216-S-20 CRIB-222S20040166

- References:
1. M. E. Todd-Robertson et al., "Analytical Instruction: 200-LW-1 and 200-LW-2 Operable Unit Characterization Sampling and Analysis Concurrence for Analytical Requirements," Fluor Hanford Groundwater Remediation Project, dated September 1, 2004.
 2. HNF-SD-CP-QAPP-016, *222-S Laboratory Quality Assurance Plan*, Revision 8, dated January 29, 2004.
 3. Letter, H. L. Anastos, FH, to Distribution, "Semi-Volatile Organic Compound Analysis," FH-0300526, dated February 3, 2003.
 4. Letter, H. L. Anastos, FH, to Distribution, "Volatile Organic Compound Analysis," FH-0300583, dated February 3, 2003.
 5. RPP-6268, *TWINS/Labcore Configuration Control Desk Manual*, Revision 1, CH2M HILL Hanford Group, Inc., Richland, Washington, dated April 19, 2002.
 6. SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, Third Edition, as amended, U.S. Environmental Protection Agency, Washington, D.C., September 1986.

This letter and four attachments represent the final analytical data report for the soil samples from the 216-S20 crib, which were received at the 222-S Laboratory on August 30, 2004. The samples were analyzed in accordance with Reference 1 through Reference 5.

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Mr. S. J. Trent
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October 13, 2004

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Should you have any questions regarding this matter, please contact me at 373-4314.

Very truly yours,

A handwritten signature in cursive script, reading "Ruth A. Bushaw".

R. A. Bushaw, Project Coordinator
Analytical Project Management

dtb

Attachments (4)

00000003

CH2M-0403032 10/13/2004 10:48 AM

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Attachment 1

NARRATIVE

Consisting of 7 pages, including coversheet

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222-S LABORATORY
FINAL REPORT FOR THE SOIL SAMPLES FROM 216-S-20 CRIB-222S20040166

1.0 INTRODUCTION

Two soil samples from the 216-S-20 crib were received at the 222-S Laboratory on August 30, 2004. The samples were analyzed in accordance with the *200-LW-1 and 200-LW-2 Operable Unit Characterization Sampling and Analysis Concurrence for Analytical Requirements* (analytical instructions) (Reference 1), *222-S Laboratory Quality Assurance Plan* (QAPP-016, Reference 2), "Semi-Volatile Organic Compound Analysis" (Reference 3), and "Volatile Organic Compound Analysis" (Reference 4), referenced in the cover letter.

A Data Summary Report is included as Attachment 2. The correlation between the customer sample identification number and laboratory identification numbers is presented in the Sample Breakdown Diagrams included as Attachment 3. Copies of the receipt paperwork are included as Attachment 4.

2.0 SAMPLE APPEARANCE AND HANDLING

Sample delivery group 222S20040166 consists of customer samples B191F1 and B191J2. The samples were collected on August 18, 2004, but were not delivered to the laboratory until August 30, 2004. The samples were described as dark brown, medium coarse sand with some small stones.

Except for analysis for volatile organic compounds (VOC), the samples were stirred with a spatula prior to removing aliquots for analysis. With this type of sample, this method is typically not sufficient to achieve homogenization. Typically, the effectiveness of the homogenization can be determined by evaluating the relative percent difference (RPD) between sample and duplicate results. However, since many of the requested analytes were not detected in the sample, an RPD wasn't calculated for all analytes. A further discussion of homogeneity is included in Section 5.3.

For the VOC analysis, three 40-mL bottles were filled to the top with soil, leaving no head space. No preservative was added to the sample bottles in the field. With the sample received in this configuration, the bottles had to be opened in a hood to obtain aliquots for analysis. To reduce the time that the sample was exposed to the atmosphere, it was not stirred prior to removing the aliquots. However, opening the sample to the atmosphere for even a short period of time compromises the integrity of the sample and the results may be biased low.

3.0 HOLDING TIMES

The analytical instructions requested that the laboratory make every effort to meet analytical holding times (SW-846, Reference 6 in the cover letter) for all analyses. The holding times were met for all analyses except for pH, sulfide, and cyanide (CN). For pH (24 hours) and sulfide (7 days), the holding times were not met because these samples were not delivered to the laboratory until 12 days after sampling. Reagents for the CN analysis (14-day holding time) have a short shelf life and, therefore, were ordered only after the samples were received (there was no advance notice for these samples). Since the samples were received on day 12 of the 14-day holding time, there was insufficient time to order and prepare the reagents and begin the analysis within the holding time.

4.0 ANALYTICAL RESULTS

The Data Summary Report in Attachment 2 presents the analytical results for the requested analytes. In this table, solid samples that were prepared by water digest are indicated with a "W" in the aliquot class (A#) column, and an "S" indicates a distillation preparation was used. If there is no letter identifier in this column, it indicates that the analysis was performed on a direct subsample with no separate preparation or with sample preparation that was included as part of the analytical procedure steps.

Note that the "Unit" column in the Data Summary Report indicates the units for the sample results. The reporting units for the blank do not all match those for the sample results. The units for the blank are µg/mL for the anions and ammonium reported by ion chromatography (IC), as well as for CN, sulfide, and mercury.

5.0 QUALITY CONTROL RESULTS

5.1 LABORATORY CONTROL SAMPLES

The accuracy of the analysis was evaluated from the recovery of a laboratory control sample (LCS) and a matrix spike (MS). The requested accuracy was 70-130% recovery. The requested accuracy of the LCS for the pH analysis was ± 0.1 pH units.

All LCS recoveries were acceptable in accordance with the analytical instructions and QAPP-016. The LCS for the pH analysis also met the requested criterion.

For the semivolatile organic compound (SVOC) and the VOC analyses, the analytical instructions only required the set of compounds indicated in the letter from H. L. Anastos (Reference 3). However, tributyl phosphate was added to the "typical" standard mix used for LCS for the SVOC analysis because it was a requested analyte for reporting. Since this compound is not on the "typical" reporting list, the quality control (QC) parameters for this compound were not set up in the laboratory database, and the QC results for the LCS are not included in the Data Summary Report. The LCS recovery was 122% for the tributyl phosphate.

For the VOC analysis, a ketone mix (containing 4-methyl-2-pentanone, 2-butanone, and acetone) and butanol were part of the standard mix used for the LCS in addition to the "typical" set of compounds indicated in the letter from H. L. Anastos (Reference 4). These compounds are part of the QC protocol associated with an unrelated project. Although the LCS and MS recoveries for ketones and 1-butanol were not required to be reported, they are included in the Data Summary Report because they are compounds requested in the analytical instructions.

5.2 METHOD AND PREPARATION BLANKS

For most analyses, no analytes were detected in the method or preparation blank. However, F and Cl were detected in the blank that was prepared and analyzed with the IC anion analysis. The level of Cl detected in the sample was the same as that detected in the preparation blank. The level of F detected in the sample was only about 3.5 times higher than that detected in the preparation blank. These levels of contamination are considered significant and the results should be considered biased high due to the contamination level. The sample was not re-prepared or reanalyzed because the reported results were lower than the level of concern for this project and concurrence was received from the customer point of contact to report the biased results.

5.3 DUPLICATE ANALYSES

One duplicate sample was analyzed for each method. The requested precision for analysis was $\pm 30\%$ for all methods except pH. For pH, a precision of ± 0.1 pH units was requested. The precision was assessed by calculating the RPD between the sample and duplicate results. For VOC, SVOC, and the polychlorinated biphenyl (PCB) analyses, the analysis precision was evaluated by calculating the RPD between an MS and a matrix spike duplicate (MSD). An RPD $< 30\%$ meets the requested precision. Although an RPD was calculated and reported for the pH analysis, the results were also evaluated against the requested criterion of ± 0.1 pH units. The analysis met the requested precision.

All analyte results met the RPD criterion stated in the analytical instruction. However, note that for phosphate and sulfate, the sample portion was reported as less than the detection limit and the duplicate had positive results. Therefore, as discussed previously, no RPD was calculated for these analytes. For the phosphate, the duplicate result was only slightly above the detection limit. However, for sulfate, the sample result was $< 12.8 \mu\text{g/g}$ and the duplicate had a positive result of $21.2 \mu\text{g/g}$. The duplicate result is less than two times the detection limit and should be considered an estimate due to the reduced precision of the analysis near the detection limit. The large difference between the sample and duplicate results is likely a consequence of the inhomogeneity of the sample. The laboratory does not have appropriate equipment to effectively homogenize a sample that contains both sand and stones, so no reanalysis was requested.

The Data Summary Report does not report the RPDs for the MS/MSD analysis. This information is provided in Table 1 for VOC, Table 2 for SVOC, and Table 3 for PCB analysis.

Table 1. MS/MSD Recoveries and RPD for VOC.

Compound	MS (%)	MSD (%)	RPD (%)
Benzene	110	110	0
Chlorobenzene	110	109	1
1,1-Dichloroethene	98	97	1
Toluene	112	111	1
Trichloroethene	94	95	1
Acetone	80	85	6
2-Butanone	78	83	6
4-Methyl-2-pentanone	110	114	4
1-Butanol	62	73	16

Table 2. MS/MSD Recoveries and RPD for SVOC.

Compound	MS (%)	MSD (%)	RPD (%)
Phenol	81	74	9
2-Chlorophenol	78	70	11
1,4-Dichlorobenzene	82	70	16
N-Nitroso-di-n-propylamine	80	70	13
1,2,4-Trichlorobenzene	82	72	13
4-Chloro-3-methylphenol	88	84	5
Acenaphthene	89	81	9
4-Nitrophenol	100	96	4
2,4-Dinitrotoluene	97	92	5
Pentachlorophenol	100	95	5
Pyrene	108	100	8
Tributyl phosphate	111	119	7

Table 3. MS/MSD Recoveries and RPD for PCB.

Compound	MS (%)	MSD (%)	RPD (%)
Aroclor-1254	108	124	14

5.4 MATRIX SPIKE AND MATRIX SPIKE DUPLICATE

Where applicable, one MS sample was analyzed for each method. An MS analysis was not applicable for the pH analysis. For PCB analysis, only Aroclor-1254 is included in the MS because it is the aroclor most commonly detected in samples on the Hanford Site. For the SVOC analysis, tributyl phosphate was not listed in the letter from H. L. Anastos (Reference 3) but was added to the standard mix for the MS. As discussed for the LCS, the MS recovery also was not included in the Data Summary Report, but is included in Table 2. For the VOC analysis, the MS contained the same "non-typical" compounds as discussed for the LCS, and the recoveries are included in the Data Summary Report and in Table 1.

As stated in Section 5.1, the accuracy of the analyses was evaluated from the LCS and MS recoveries, with a requested accuracy of 70-130% recovery. All MS and MSD recoveries met the criterion listed in the analytical instructions, except the MS for 1-butanol. The MS recovery for 1-butanol was low (62%) and the recovery for the MSD (73%) was just inside the requested limits. The sample, MS, and MSD were analyzed twice, with low recoveries each time. Therefore, the low recovery was attributed to matrix interference, so no further reanalysis was requested. The matrix interference could cause a low bias in the quantitation for the 1-butanol.

The Data Summary Report does not report the recoveries for the MSD analyses. This information is provided in Tables 1, 2, and 3.

5.5 SURROGATE RECOVERIES

Surrogate standards are added to all field and QC samples for VOC, SVOC, and PCB analyses. The surrogate is added to monitor total method recovery through preparation, sample matrix cleanup, and analysis. The surrogate recovery for the preparation blank analyzed for PCB was high, which would indicate a high bias. However, since no PCBs were detected in the blank and the surrogate recoveries for the sample, MS, and MSD all met the acceptance criteria, the results should be considered accurate as reported. One of the six surrogates analyzed with the SVOC (2,4,6-tribromophenol) had slightly high recoveries for all field and QC samples. The recoveries were outside of the statistical limits but within the administrative limits for the method. No reanalysis was requested because the MS and MSD recoveries were all within the acceptance limits, indicating that the accuracy of the analysis was acceptable. The high surrogate recoveries did not affect the usability of the reported results. All surrogate recoveries for the VOC analysis met the requirements in QAPP-016.

5.6 TENTATIVELY IDENTIFIED COMPOUNDS

The analytical instruction lists n-butyl benzene as a target compound for VOC analysis. The laboratory does not routinely report results for this compound, as indicated in the letter from H. L. Anastos (Reference 4). Review of the data indicated that n-butyl benzene was not detected in the sample. Also, no other tentatively identified compounds were detected.

5.7 TARGET QUANTITATION LIMITS

The analytical instructions listed target quantitation limits (TQL) for each requested analyte. The Data Summary Report provides method detection limits (MDL). These must be converted to estimated quantitation limits (EQL) to compare with the requested TQLs. The EQL is calculated as 10 times the reported MDL. Analytes that are detected above the MDL but are less than the EQL are qualified with a "J" flag, as specified in the *TWINS/Labcore Configuration Control Desk Manual* (Reference 5 in the cover letter), to indicate that the result should be considered an estimate because the concentration is less than that which can be reliably achieved within the specified limits of precision and accuracy.

The laboratory EQLs did not all meet the requested TQLs because the procedures and equipment have been altered to handle small sample sizes to reduce the level of radioactive exposure to the analyst. For the PCB and Hg analyses, the reported concentrations are greater than 10 times the laboratory MDL and the requested TQL. Therefore, these results should be considered accurate, regardless of the EQL. For the other analyses, the laboratory used the largest feasible sample sizes to obtain the lowest detection limits possible.

6.0 ANALYTICAL PROCEDURES

Table 4 presents the 222-S Laboratory analytical procedures used to generate the reported results.

Table 4. Analytical Procedures.

Analysis	Preparation Procedure	Analysis Procedure
Inorganic Analyses		
pH	Direct	LA-212-105 Rev. D-0
Hg	Direct	LA-325-106 Rev. C-1
CN	Direct	LA-695-102 Rev. I-2
NH ₄	Distillation	LA-533-101 Rev. L-0
IC	Water digest	LA-533-107 Rev. D-0
Sulfide	Direct	LA-361-101 Rev. A-2
Organic Analyses		
VOC	Direct	LA-523-118 Rev. A-2
SVOC	Organic extraction	LA-523-135 Rev. A-2
PCB	Organic extraction	LA-523-140 Rev. C-0

Notes:

Water digest procedure: LA-504-101 Rev. I-0

Distillation procedure: LA-544-112 Rev. A-1

Organic extraction procedure: LA-523-138 Rev. D-0

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Attachment 2

DATA SUMMARY REPORT

Consisting of 4 pages, including coversheet

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Attachment 2
S20 CRIB
Data Summary Report

CORE NUMBER: 222S20040166
SEGMENT #: B191F1

SEGMENT PORTION: NH₄ Distillation

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S04M000279	S		Ammonium Ion-IC-Dionex 100	ug/g	99.2	<0.100	<46.3	<45.4	n/a	n/a	101	46	n/a	U

SEGMENT PORTION: PCB

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S04M000277			Aroclor-1016MET by SW-846 8082	ug/Kg	n/a	<82	<40	n/a	n/a	n/a	n/a	4.e+01	n/a	U
S04M000277			Aroclor-1221MET by SW-846 8082	ug/Kg	n/a	<26	<13	n/a	n/a	n/a	n/a	1.e+01	n/a	U
S04M000277			Aroclor-1232MET by SW-846 8082	ug/Kg	n/a	<4.6e+02	<2.3e+02	n/a	n/a	n/a	n/a	2.e+02	n/a	U
S04M000277			Aroclor-1242MET by SW-846 8082	ug/Kg	n/a	<84	<41	n/a	n/a	n/a	n/a	4.e+01	n/a	U
S04M000277			Aroclor-1248MET by SW-846 8082	ug/Kg	n/a	<27	<13	n/a	n/a	n/a	n/a	1.e+01	n/a	U
S04M000277			Aroclor-1254MET by SW-846 8082	ug/Kg	93	<16	1.7e+02	n/a	n/a	n/a	1.1e+02	8	n/a	U
S04M000277			Aroclor-1260MET by SW-846 8082	ug/Kg	n/a	<1.1e+02	<55	n/a	n/a	n/a	n/a	5.e+01	n/a	U

SEGMENT PORTION: Parent

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S04M000274			Cyanide Water Distillation	ug/g	107	<0.0550	<0.278	<0.275	n/a	n/a	108	0.28	n/a	U
S04M000274			Mercury by CVAA (PE) with FIAS	ug/g	103	<1.00e-04	66.6	79.8	73.2	18.0	110	0.69	n/a	U
S04M000274			pH on Solid Samples	pH	n/a	n/a	8.14	8.18	8.16	0.490	n/a	0.010	n/a	U

SEGMENT PORTION: SVOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S04M000276			Pentachlorophenol	ug/Kg	93	<1.0e+03	<9.2e+02	n/a	n/a	n/a	1.0e+02	9.e+02	n/a	U
S04M000276			Phenol	ug/Kg	77	<1.0e+03	<9.2e+02	n/a	n/a	n/a	81	9.e+02	n/a	U
S04M000276			2-Chlorophenol	ug/Kg	74	<1.0e+03	<9.2e+02	n/a	n/a	n/a	78	9.e+02	n/a	U
S04M000276			Pyrene	ug/Kg	1.0e+02	<1.0e+03	<9.2e+02	n/a	n/a	n/a	1.1e+02	9.e+02	n/a	U
S04M000276			N-Nitroso-di-n-propylamine	ug/Kg	75	<1.0e+03	<9.2e+02	n/a	n/a	n/a	80	9.e+02	n/a	U
S04M000276			1,2,4-Trichlorobenzene SV	ug/Kg	79	<1.0e+03	<9.2e+02	n/a	n/a	n/a	82	9.e+02	n/a	U
S04M000276			4-Chloro-3-methylphenol	ug/Kg	85	<1.0e+03	<9.2e+02	n/a	n/a	n/a	88	9.e+02	n/a	U
S04M000276			Acenaphthene	ug/Kg	84	<1.0e+03	<9.2e+02	n/a	n/a	n/a	89	9.e+02	n/a	U
S04M000276			4-Nitrophenol	ug/Kg	96	<1.0e+03	<9.2e+02	n/a	n/a	n/a	1.0e+02	9.e+02	n/a	U
S04M000276			2,4-Dinitrotoluene	ug/Kg	95	<1.0e+03	<9.2e+02	n/a	n/a	n/a	97	9.e+02	n/a	U
S04M000276			1,4-Dichlorobenzene	ug/Kg	77	<1.0e+03	<9.2e+02	n/a	n/a	n/a	82	9.e+02	n/a	U
S04M000276			Tri-n-butylphosphate	ug/Kg	n/a	<1.0e+03	<9.2e+02	n/a	n/a	n/a	n/a	9.e+02	n/a	U

SEGMENT PORTION: VOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S04M000273			Methylene Chloride	ug/Kg	n/a	<1.3	<1.3	n/a	n/a	n/a	n/a	1	n/a	U
S04M000273			Acetone	ug/Kg	1.1e+02	<0.92	<0.92	n/a	n/a	n/a	80	0.9	n/a	U
S04M000273			1-Butanol	ug/Kg	93	<4.0	<3.9	n/a	n/a	n/a	62	4	n/a	U
S04M000273			1,1-Dichloroethane	ug/Kg	n/a	<0.80	<0.80	n/a	n/a	n/a	n/a	0.8	n/a	U
S04M000273			1,2-Dichloroethene (cis & tran	ug/Kg	n/a	<1.4	<1.4	n/a	n/a	n/a	n/a	1	n/a	U

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Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S04M000273			Chloroform	ug/Kg	n/a	<0.72	<0.72	n/a	n/a	n/a	n/a	0.7	n/a	U
S04M000273			1,2-Dichloroethane	ug/Kg	n/a	<0.76	<0.76	n/a	n/a	n/a	n/a	0.8	n/a	U
S04M000273			2-Butanone	ug/Kg	1.0e+02	<0.82	<0.82	n/a	n/a	n/a	78	0.8	n/a	U
S04M000273			1,1,1-Trichloroethane	ug/Kg	n/a	<0.70	<0.70	n/a	n/a	n/a	n/a	0.7	n/a	U
S04M000273			Carbon Tetrachloride	ug/Kg	n/a	<1.3	<1.3	n/a	n/a	n/a	n/a	1	n/a	U
S04M000273			Trichloroethene	ug/Kg	96	<0.86	<0.86	n/a	n/a	n/a	95	0.9	n/a	U
S04M000273			1,1,2-Trichloroethane	ug/Kg	n/a	<0.68	<0.68	n/a	n/a	n/a	n/a	0.7	n/a	U
S04M000273			Benzene	ug/Kg	1.1e+02	<0.66	<0.66	n/a	n/a	n/a	1.1e+02	0.7	n/a	U
S04M000273			4-Methyl-2-pentanone	ug/Kg	1.2e+02	<0.74	<0.74	n/a	n/a	n/a	1.1e+02	0.7	n/a	U
S04M000273			Tetrachloroethene	ug/Kg	n/a	<0.70	<0.70	n/a	n/a	n/a	n/a	0.7	n/a	U
S04M000273			Toluene	ug/Kg	1.1e+02	<0.64	<0.64	n/a	n/a	n/a	1.1e+02	0.6	n/a	U
S04M000273			Chlorobenzene	ug/Kg	1.1e+02	<0.76	<0.76	n/a	n/a	n/a	1.1e+02	0.8	n/a	U
S04M000273			Ethylbenzene	ug/Kg	n/a	<0.98	<0.98	n/a	n/a	n/a	n/a	1	n/a	U
S04M000273			Xylenes (total)	ug/Kg	n/a	<1.6	<1.6	n/a	n/a	n/a	n/a	2	n/a	U
S04M000273			1,1-Dichloroethene	ug/Kg	99	<0.76	<0.76	n/a	n/a	n/a	98	0.8	n/a	U

SEGMENT PORTION: Water Digest

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S04M000278			Fluoride IC SW846	ug/g	96.2	0.0200	6.51	6.74	6.63	3.39	91.7	1.1	n/a	BC
S04M000278			Chloride SW-846	ug/g	98.5	0.0200	1.86	1.92	1.89	3.39	101	1.6	n/a	BC
S04M000278			Nitrite IC SW846	ug/g	93.6	<0.108	<10.0	<10.4	n/a	n/a	95.5	10	n/a	U
S04M000278			Nitrate by IC SW846	ug/g	97.9	<0.139	18.6	17.3	18.0	7.15	98.2	13	n/a	B
S04M000278			Phosphate by IC SW846	ug/g	95.4	<0.120	<11.2	11.5	n/a	n/a	95.5	11	n/a	U
S04M000278			Sulfate by IC SW846	ug/g	94.5	<0.138	<12.8	21.2	n/a	n/a	96.9	13	n/a	U

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BC
3/2/05
102
3/2/05

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Dugies

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Attachment 2
S20 CRIB
Data Summary Report

CORE NUMBER: 222S20040166
SEGMENT #: B191J2

SEGMENT PORTION: Parent

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S04M000275			Sulfide by Microdist. & ISE	ug/g	97.2	<0.158	23.9	28.0	25.9	15.6	92.0	15	n/a	B

1/27
3/2/05

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REVISED
3/3/05
Revis Auges

CH2M-0403032

Attachment 3

SAMPLE BREAKDOWN DIAGRAM

Consisting of 2 pages, including coversheet

00000015

S20 CRIB
216-S-20 Borehole Samples
Group 222S20040166

B191F1

120 mL amber
(cool 4°C)



S04M000271
Received



S04M000276
SVOC: TBP, phenol
(Method 8270)

B191F1

120 mL amber
(cool 4°C)



S04M000272
Received



S04M000277
PCB
(Method 8082)

B191F1

3x40 mL amber
(cool 4°C)



S04M000273
Received
VOC
(Method 8260)

B191F1

120 mL amber



S04M000274
Received
Hg
pH
CN



S04M000278
IC: F, Cl, NO₂, NO₃,
PO₄, SO₄



S04M000279
IC: NH₄

B191J2

250 ml amber
(cool 4°C)



S04M000275
Received
Sulfide

00000016

CH2M-0403032

Attachment 4

RECEIPT PAPERWORK

Consisting of 5 pages, including coversheet

00000017

FLUOR Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F03-025-094		PAGE 1 OF 2	
COLLECTOR Pcpe/Pfister/Wiberg/Tyra		COMPANY CONTACT TRENT, STEVE		TELEPHONE NO. 373-5689		PROJECT COORDINATOR TRENT, SJ		PRICE CODE 8N DATA TURNAROUND 45 Days / 45 Days	
SAMPLING LOCATION <i>AB-8/10/04</i> 216-S-20; 22-04-34-54 <i>29.5' - 32'</i>		PROJECT DESIGNATION 200-LW-1/LW-2 Characterization - Soil				SAF NO. F03-025		AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO.		FIELD LOGBOOK NO. HNF-N-356 1		COA 119143ES10		METHOD OF SHIPMENT Government Vehicle			
SHIPPED TO <i>Waste Sampling & Characterization</i> <i>8/30/04</i> <i>222-S</i>		OFFSITE PROPERTY NO. N/A				BILL OF LADING/AIR BILL NO. N/A			
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS N/A	PRESERVATION	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None
		TYPE OF CONTAINER	Gs*	aG	aG	Gs*	P	aG	aG
		NO. OF CONTAINER(S)	3	1	1	3	1	1	1
		VOLUME	40mL	120mL	120mL	40mL	500mL	250mL	120mL
SPECIAL HANDLING AND/OR STORAGE N/A		SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	FOR 1002; SEE ITEM (3) IN SPECIAL INSTRUCTIONS	SEE ITEM (4) IN SPECIAL INSTRUCTIONS	SEE ITEM (5) IN SPECIAL INSTRUCTIONS	SEE ITEM (6) IN SPECIAL INSTRUCTIONS	
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME						
B191F1	SOIL	8-18-04	0858	X	X	X	X	X	X
CHAIN OF POSSESSION		SIGN/ PRINT NAMES				SPECIAL INSTRUCTIONS SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS			
RELINQUISHED BY/REMOVED FROM <i>JS/PE/1/1/04</i>		DATE/TIME <i>8-18-04</i>		RECEIVED BY/STORED IN <i>JS/PE/1/1/04</i>		DATE/TIME <i>8-18-04</i>			
RELINQUISHED BY/REMOVED FROM <i>site page 1/1/04</i>		DATE/TIME <i>8/30/04</i>		RECEIVED BY/STORED IN <i>JS/PE/1/1/04</i>		DATE/TIME <i>8/30/04</i>			
RELINQUISHED BY/REMOVED FROM <i>JS/PE/1/1/04</i>		DATE/TIME <i>8-30-04</i>		RECEIVED BY/STORED IN <i>Richards/Richards</i>		DATE/TIME <i>8-30-04</i>			
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME			
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME			
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME			
LABORATORY SECTION	RECEIVED BY		TITLE		DATE/TIME				
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD 00000018		DISPOSED BY		DATE/TIME				

FLUOR Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F03-025-094	PAGE 2 OF 2
COLLECTOR Pope/Pfister/Wiberg/Tyra	COMPANY CONTACT TRENT, STEVE	TELEPHONE NO. 373-5689	PROJECT COORDINATOR TRENT, SJ	PRICE CODE 8N	DATA TURNAROUND
SAMPLING LOCATION 216-S-20; 02.00-04.50 29.5'-32'	PROJECT DESIGNATION 200-LW-1/LW-2 Characterization - Soil		SAF NO. F03-025	AIR QUALITY <input type="checkbox"/>	45 Days
ICE CHEST NO. 8-70-101	FIELD LOGBOOK NO. HNF-N-356 1	COA 119143ES10	METHOD OF SHIPMENT Government Vehicle		
SHIPPED TO Waste Sampling & Characterization	OFFSITE PROPERTY NO. N/A		BILL OF LADING/AIR BILL NO. N/A		

SPECIAL INSTRUCTIONS

The lab is to analyze pH within 24 hours of sample receipt. The lab is to report kerosene range organics from the WTPH-D analysis. FH acknowledges that the analytical holding time for Nitrate, Nitrite and Phosphate by EPA Method 300.0 will not be met.

- (1)VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Butanol)
 (2)Semi-VOA - 8270A (TCL) (Phenol) Semi-VOA -- 8270A (Add-On) (Tributyl phosphate) TPH-Diesel Range - WTPH-D (Total petroleum hydrocarbons - diesel range, Total petroleum hydrocarbons - kerosene range) TPH-Gasoline Range - WTPH-G;
 (3)Alcohols, Glycols, & Ketones - 8015 (Ethylene glycol) *APR 8/24/04*
 (4)Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155) Gamma Spec - Add-on (Antimony-125, Cesium-134) ISOTOPIc Plutonium, Isotopic Uranium; Neptunium-237, Americium-241; *APR 8/24/04*
 (5)ICP/MS - 200.8 (ICP) (Antimony, Barium, Cadmium, Chromium, Copper, Nickel, Silver) ICP/MS - 200.8 (Add-on) (Arsenic, Beryllium, Lead, Mercury, Selenium, Uranium) ICP Metals - 6010A (Add-on) (Bismuth) (BORON) *APR 8/24/04*
 (6)IC Anions - 300.0 (Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphate, Sulfate) Cations (IC) - 300.7 (Nitrogen in ammonium) Cyanide (Total) - 335.2; pH (Soil) - 9045; Hg B1 method 7471

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FLUOR Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F03-025-114		PAGE 1 OF 1	
COLLECTOR Pope/Pfister/Wiberg/Tyra		COMPANY CONTACT TRENT, STEVE		TELEPHONE NO. 373-5689	PROJECT COORDINATOR TRENT, SJ		PRICE CODE 8N	DATA TURNAROUND 45 Days / 45 Days
SAMPLING LOCATION <i>16-3-10-34</i> 216-S-20; 22-0R-34-3R <i>29.5' - 32'</i>		PROJECT DESIGNATION 200-LW-1/LW-2 Characterization - Soil			SAF NO. F03-025		AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO.		FIELD LOGBOOK NO. HNF-N-356 1		COA 119143ES10	METHOD OF SHIPMENT Federal Express			
SHIPPED TO <i>8/18/04</i> Baseline Services <i>222-5</i> <i>Receiv 8/24/04</i>		OFFSITE PROPERTY NO.			BILL OF LADING/AIR BILL NO.			
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS N/A	PRESERVATION	Cool 4C	None				
		TYPE OF CONTAINER	gG	gG				
		NO. OF CONTAINER(S)	1	1				
		VOLUME	250mL	250mL				
	SPECIAL HANDLING AND/OR STORAGE N/A	SAMPLE ANALYSIS		SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS			
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME					
B191J2	SOIL	<i>8-18-04</i>	<i>0850</i>	<i>X</i>				
CHAIN OF POSSESSION		SIGN/ PRINT NAMES			SPECIAL INSTRUCTIONS			
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	<i>198-8/18/04</i> <i>198-8/18/04</i> (1)Ghramium Hex - 7196; NO2/NO3 - 353.2; Sulfides - 9030; Oil & Grease - 413.1; (2)Nickel-63; Gamma Spec - Radium (Radium-226, Radium-228) Technetium-99; Isotope Thorium (Thorium-232) Tritium - H3; Carbon-14; Strontium-89,90 - Total <i>8-4-04</i>				
<i>198-8/18/04</i>	<i>1200</i>	<i>site 6/4- RMA</i>	<i>8-18-04 1200</i>					
<i>site 6/4- RMA</i>	<i>8/20/04 1400</i>	<i>J. Spiller</i>	<i>8/20/04 1400</i>					
<i>J. Spiller</i>	<i>8/30/04 1415</i>	<i>KLH</i>	<i>8-30-04</i>					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME					
LABORATORY SECTION	RECEIVED BY	TITLE			DATE/TIME			
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY			DATE/TIME			

00000020

GENERATOR KNOWLEDGE INFORMATION

1. Chain of Custody Number _____ CACN/COA 119142/ES20 Customer Identification Number SAF F03-020

2. List generator knowledge or description of process that produced sample. Or list description of sample source:

Characterization samples collected from a characterization borehole drilled near the 216-S-20 waste site

MSDS Available? ☐ No ☒ Yes Hanford MSDS No. _____

3. List all waste codes and constituents associated with the waste or media that was sampled, regardless of CERCLA status.

a) Does the sample contain any of the following listed waste codes?

By checking "unknown" the customer understands that no knowledge is available following a careful search.

List Federal Waste Code(s):

List Constituent(s):

P Codes: _____	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
U Codes: _____	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
K Codes: _____	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
F Codes: _____	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown

b) List applicable characteristic waste codes, flash point, pH, constituents, and concentrations as appropriate.

D001: <input type="checkbox"/> FP <100°F	<input type="checkbox"/> FP ≥100 <140°F	<input type="checkbox"/> DOT Oxidizer	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
D002: <input type="checkbox"/> pH ≤	<input type="checkbox"/> pH ≥12.5	<input type="checkbox"/> Solid Corrosive (WSC2)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
D003: <input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Water Reactive	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
D004-D043 (Identify applicable waste codes and concentrations):			<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown

Other (i.e., peroxide former, explosive, air reactive)

N/A

c) If characteristic, list any known underlying hazardous constituents (UHCs) reasonably expected to be present, and their concentrations that may be present above the LDR treatment standard (40 CFR 268.48):

N/A

d) List any known Land Disposal Restrictions (LDR) subcategories, if applicable (40 CFR 268.40):

N/A

e) List any applicable Washington State dangerous waste codes: (not required if federally regulated)

(*State mixture rule for ignitability)

WT01: <input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
WT02: <input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
W001: <input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown

WP01: <input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
WP02: <input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
WP03: <input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
F003: <input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown

List constituents and concentrations:

N/A

4. Is this material TSCA regulated for PCBs? ☐ Yes ☒ No ☐ Unknown ☐ Analysis Requested

List concentration if applicable: _____

If yes, what is the source of the PCBs? (see TSCA PCB Hanford Site User Guide, DOE/RL-2001-50)

<input type="checkbox"/> PCB Liquid Waste	<input type="checkbox"/> PCB Bulk Product Waste	<input type="checkbox"/> PCB Transformer ≥500 ppm	<input type="checkbox"/> Unknown
<input type="checkbox"/> PCB Remediation Waste	<input type="checkbox"/> PCB R&D Waste	<input type="checkbox"/> PCB contaminated electrical equipment (capacitor/ballast) <500 ppm	
<input type="checkbox"/> PCB Spill Material	<input type="checkbox"/> PCB Item	<input type="checkbox"/> Other PCB Waste (list) _____	

5. Is this material TRU? ☐ Yes ☒ No ☐ Unknown

6 ACCURACY OF INFORMATION

Based on my inquiry of those individuals immediately responsible for obtaining this information, that to the best of my knowledge, the information entered in this document is true, accurate, and complete.

Print & Sign _____

Date

8/19/04